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Notes on *Eosentomon belli* YIN (Protura, Eosentomidae),  
with Description of a New Species from  
Yunnan, Southwest China<sup>1)</sup>

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**Abstract** Irregular asymmetrical pattern is found on sternal chaetotaxy in two eosentomid forms from Yunnan, *Eosentomon belli* YIN and *E. dian* sp. nov. These forms lack one of P1 on abdominal sternites I–VII.

**Key words:** Protura; asymmetrical chaetotaxy; *Eosentomon*; Yunnan.

*Eosentomon belli* was described from only male specimen from Monlun (=Menglun), Yunnan (YIN, 1982). In this specimen, one of P1 is irregular absent on abdominal sternites I–VII: right P1 is lacking on stern. III and V, and left P1 on the others. This unusual irregularity was considered to be an individual abnormality, and no special attention was paid to it in the original description, since such irregular asymmetry had never been encountered in other eosentomids.

Through the soil faunistic surveys made by our Sino-Japanese joint party in Yunnan for 1992 and 1993 (IMADATÉ & TAMURA, 1994), ample material of *Eosentomon belli* has been obtained from various collecting sites in Xishuangbanna. An examination of this collection proved that the irregular asymmetry of sternal chaetotaxy was not exceptional, but constant in both the adults and all the larval stages.

We detected the same irregular pattern in the sternal chaetotaxy of an undescribed form obtained from Mt. Ailao Shan in the central part of Yunnan. It is highly probable that the peculiar pattern is not due to a mere local aberration, but can be regarded as a specific feature in these two forms.

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In the present paper, we are going to give a redescription of *Eosentomon belli* and a description of the new species mentioned above, under the name *E. dian* sp. nov. The type specimen to be designated in the present paper is deposited in the collection of the Shanghai Institute of Entomology, Academia Sinica, China.

We wish to express our hearty thanks to Mr. CHENG Yi-cun, Professor LI Chao-da, Dr. Shun-Ichi UENO, Professor XIAO Ning-nian, Mr. ZHANG Jun and all who favoured us with every kind of help through our cooperative works.

*Eosentomon belli* YIN

(Fig. 1)

*Eosentomon belli* YIN, 1982, Zool. Res., Kunming, 3: 15–17 & 27.

*New species examined.* 11♂, 6♀, 1 maturus junior, 5 larva II, 1 larva I, Menglun (Xishuangbanna Botanical Garden), 550 m alt., Xishuangbanna, Yunnan, 9-IV-1992, collected by LI Chao-da & others; 1♂, 4♀, ditto, 28-X-1992, collected by XIAO Ning-nian & others; 21♂, 12♀, 5 larva II, 1 larva I, Mengla, 720 m alt., Xishuangbanna, Yunnan, 10-IV-1992, XIE Rong-dong & others; 2♂, 2♀, ditto, 21-IX-1992, collected by LI Chao-da & others; 1♂, 1♀, ditto 13-IX-1993, collected by XIAO Ning-nian & others.

Body length 850–900 µm.

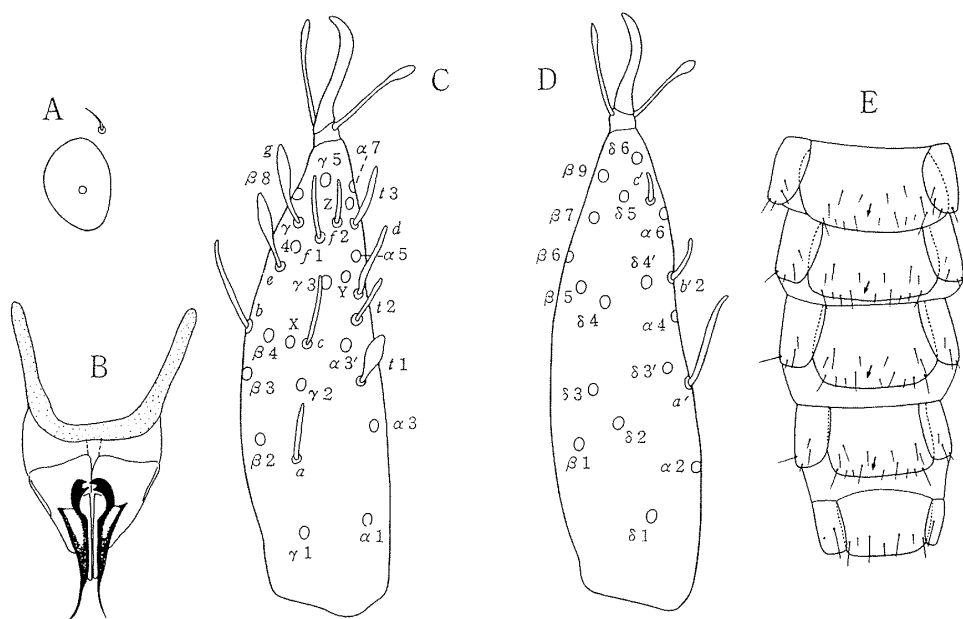


Fig. 1. *Eosentomon belli* YIN. — A, Pseudoculus; B, female squama genitalis; C, foretarsus, exterior view; D, the same, interior view; E, ventral chaetotaxy of abdomen IV–VIII. Arrows indicate asymmetrical absence of setae.

Table 1. Chaetotaxy of *Eosentomon belli* YIN.\*

		Dorsal		Ventral	
		Formula	Composition of setae	Formula	Composition of setae
Thorax	I	4		$\frac{6-2}{6}$	A1, 2, 3, M P1, 2, 3
	II	$\frac{6}{18}$	A2, 4, M P1, 1a, 2, 2a, 3, 3a, 4, 5, 5a	$\frac{6-2}{6}$	A1, 2, 3, M P1, 2, 3
	III	$\frac{6}{18}$	A2, 4, M P1, 1a, 2, 2a, 3, 3a, 4, 5, 5a	$\frac{6-4}{8}$	A1, 2, 3, M1, 2 P1, 2, 3, 4
Abdomen	I	$\frac{4}{12}$	A1, 2 P1, 1a, 2, 2a, 3, 4	$\frac{4}{3}$	A1, 2 P(1), 2
	II-III	$\frac{10}{16}$	A1, 2, 3, 4, 5 P1, 1a, 2, 2a, 3, 4, 4a, 5	$\frac{6}{3}$	A1, 2, 3 P(1), 2
	IV	$\frac{10}{16}$	A1, 2, 3, 4, 5 P1, 1a, 2, 2a, 3, 4, 4a, 5	$\frac{6}{9}$	A1, 2, 3 P(1), 2, 2a, 2a', 3
	V-VII	$\frac{2}{16}$	A5 P1, 1a, 2, 2a, 3, 4, 4a, 5	$\frac{6}{9}$	A1, 2, 3 P(1), 2, 2a, 2a', 3
	VIII	$\frac{6}{9}$	M2, 4, 5 Pc, 1a, 1a', 2, 2a	$\frac{0}{7}$	Pc, 1, 1a, 2
	IX-X	8	1, 2, 3, 4	4	1, 2
	XI	8	1, 2, 3, 4	8	
	XII	9		12	

\* Notation of body setae is referred to that in IMADATÉ (1994).

Head oval, 100–104  $\mu\text{m}$  in dorsal view. Anterior additional setae absent, but the posterior are present; subposterior setae about twice the posterior in length; anterior and posterior sensillae present. Labral setae present; rostral setae a little shorter than the subrostral. Maxillary palpus with two sensillae, dorsal subequal to the lateral in length. Pseudoculus ovoid, with one inner globule (Fig. 1A), PR=7.0.

Tracheal camerae slender. Foretarsus (Fig. 1C–D) 67–74  $\mu\text{m}$  (58  $\mu\text{m}$  in maturus junior, 48–50  $\mu\text{m}$  in larva II, 45  $\mu\text{m}$  in larva I), TR=3.9–4.5; empodium subequal to the claw in length; S-shaped seta a little shorter than the claw. Dorsal sensilla *t1* about a halfway between  $\alpha 3$  and  $\alpha 3'$ , BS=1.0; *t2* short; *t3* relatively long, its apex surpassing the level of  $\gamma 5$ . Exterior sensilla *a* of medium size; *d* broad and relatively long, its apex reaching the base of  $\alpha 6$ ; *e* and *g* spatulate; *fl* thin, its apex reaching the base of  $\gamma 5$ . Interior sensilla *a'* situated somewhat distal to *t1*; *b'1* lacking; *b'2* relatively short, its apex reaching the level of  $\alpha 5$ ; *c'* short. Middle and hind tarsi with short empodia less than one-ninth the claw length.

Chaetotaxy as shown in Table 1. On throaces II–III dorsal P1a situated

Table 2. Asymmetrical absence of P1 on abdominal sternites I–VII in twenty adults of *Eosentomon belli* YIN.

Abdominal sternite		I	II	III	IV	V	VI	VII
Menglun (Xishangbanna Botanical Garden), 9-VI-1992.								
Collecting site No. 1								
♂	L	+	–	+	+	–	+	+
	R	–	+	–	–	+	–	–
♀	L	+	+	+	+	+	–	+
	R	–	–	–	–	–	+	–
♀	L	–	+	+	?	–	+	?
	R	+	–	–	?	+	–	?
♀	L	–	–	+	–	?	–	–
	R	+	+	–	+	?	+	+
Collecting site No. 6								
♂	L	–	+	?	+	–	+	–
	R	+	–	?	–	+	–	+
♂	L	+	–	–	–	+	+	+
	R	–	+	+	+	–	–	–
♂	L	–	+	–	–	–	–	+
	R	+	–	+	+	+	+	–
♂	L	–	+	+	+	+	+	+
	R	+	–	–	–	–	–	–
♂	L	–	–	–	–	+	–	+
	R	+	+	+	+	–	+	–
♂	L	–	–	+	–	+	+	+
	R	+	+	–	+	–	–	–
♂	L	–	–	+	–	+	+	–
	R	+	+	–	+	–	–	+
♀	L	–	+	+	+	+	+	+
	R	+	–	–	–	–	–	–
♀	L	+	–	+	+	–	+	–
	R	–	+	–	–	+	–	+
♀	L	+	–	–	+	+	+	+
	R	–	+	+	–	–	–	–
Mengla, 10-IV-1992.								
Collecting site No. 9								
♂	L	–	?	+	+	+	–	?
	R	+	?	–	–	–	+	?
♂	L	+	+	–	–	+	+	+
	R	–	–	+	+	–	–	–
♂	L	+	+	–	–	+	+	+
	R	–	–	+	+	–	–	–
Collecting site No. 12								
♀	L	–	+	+	+	+	–	+
	R	+	–	–	–	–	+	–
Mengla, 13-IX-1993.								
Collecting site ML-1								
♂	L	–	–	–	–	+	–	+
	R	+	+	+	+	–	+	–
♀	L	–	+	–	+	+	–	+
	R	+	–	+	–	–	+	–

(Fig. 1–E)

L, left; R, right; ?, indeterminate; +, presence; –, absence.

somewhat posterior to the row of P1 and 2, seta-like and a little shorter than P1, P2a on the same row as P2 and 3, less than a half of P2 in length. Abdominal tergites II–IV each with five pairs of anterior setae; terg. V–VII each with a single pair, A5; terg. X–XI each with four pairs of tergal setae; sternite VIII with seven posterior setae, and without anterior setae; stern. IX–X each with four sternal setae and without 1a. On terg. I, P1a situated somewhat posterior to the row of P1 and 2, hair-like and a little shorter than P1, P3 and 4 sensilla-like and very short. On terg. II–VI, P1a and 2a situated somewhat posterior to the row of P1 and 2, hair-like and subequal to P1 in length. On terg. VII, P1a situated on the same row as P1 and 2, sensilla-like and short, less than one-fourth of P1 in length. On terg. VIII, P1a' without basal dilatation, in normal position. On sternites I–VII, one of P1 unevenly absent as shown in Table 2 and Fig. 1E, not only in the adults, but also through all the larval stages, matus junior, larva II and larva I. Lateral stigmata II–IV distinct, with no reticulation. Lateral sclerotization on stern. VIII distinct.

On female squama genitalis, caput processus roundly bent, sharply bifid at the apex towards the middle, filum processus relatively short, lateral sclerotization weakly developed (Fig. 1B).

Holotype: ♂, Menglun (= Monlun), 600 m alt., Xishuangbanna, Yunnan, 20-XII-1973, collected by JIN Gen-tao.

*Notes.* The present species is characterized by the asymmetrical absence of P1 on abdominal sternites I–VII. This irregularity occurs unevenly, e.g., right P1 is absent on some sternites and left P1 on the others in all the specimens examined. Such an irregularity has never been recorded in eosentomids up to the present.

### *Eosentomon dian* sp. nov.

(Fig. 2)

*Specimens examined.* 4♂, 4♀, 2 larva II, 2 larva I, Mt. Aliao Shan, 2,663 m alt., Jingdong, Yunnan, 28-III-1993, collected by XIAO Ning-nian & others; 3♂, 1♀, 1 larva I, ditto, 2,612 m alt., 28-III-1993, collected by XIE Rong-dong & others; 6♂, 3♀, 9 larva II, ditto, 2,450 m alt., 28-III-1993, collected by XIAO Ning-nian & others; 5♂, 1♀, 3 larva II, ditto, 2,430 m alt., 28-III-1993, collected by XIE Rong-dong & others.

Body length 900–1,050 µm.

Head oval, 116–130 µm in dorsal view. Anterior additional setae absent, but the posterior are present; subposterior about twice the posterior in length; anterior and posterior sensillae present. Labral setae present; rostral setae a little shorter than the subrostral. Maxillary palpus with sensillae, dorsal subequal to the lateral in length.

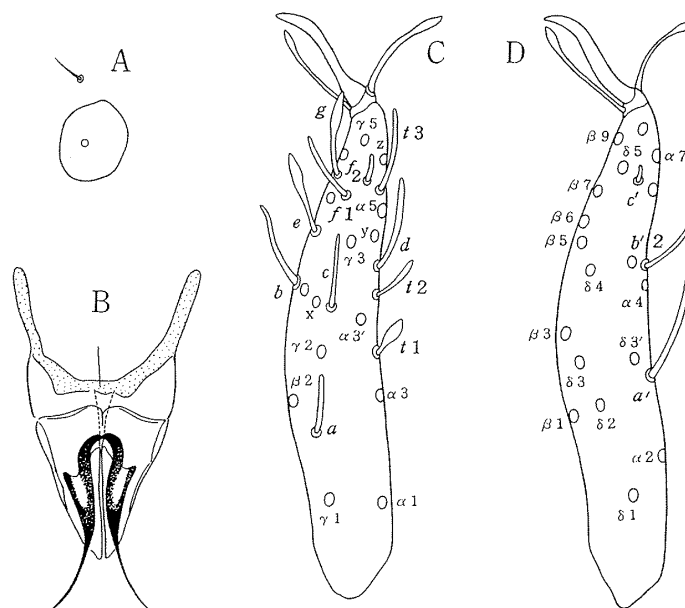


Fig. 2. *Eosentomon dian* sp. nov. — A, Pseudoculus; B, female squama genitalis; C, foretarsus, exterior view; D, the same, interior view.

Table 3. Chaetotaxy of *Eosentomon dian* sp. nov.

Dorsal				Ventral	
	Formula	Composition of setae		Formula	Composition of setae
Thorax	I	4		$\frac{6-2}{6}$	A1, 2, 3, M P1, 2, 3
	II	$\frac{6}{18}$	A2, 4, M P1, 1a, 2, 2a, 3, 3a, 4, 5, 5a	$\frac{6-2}{6}$	A1, 2, 3, M P1, 2, 3
	III	$\frac{6}{18}$	A2, 4, M P1, 1a, 2, 2a, 3, 3a, 4, 5, 5a	$\frac{6-4}{8}$	A1, 2, 3, M1, 2 P1, 2, 3, 4
Abdomen	I	$\frac{4}{12}$	A1, 2 P 1, 1a, 2, 2a, 3, 4	$\frac{4}{3}$	A1, 2 P(1), 2
	II-III	$\frac{10}{16}$	A1, 2, 3, 4, 5 P1, 1a, 2, 2a, 3, 4, 4a, 5	$\frac{6}{3}$	A1, 2, 3 P(1), 2
	IV	$\frac{10}{16}$	A1, 2, 3, 4, 5 P1, 1a, 2, 2a, 3, 4, 4a, 5	$\frac{6}{9}$	A1, 2, 3 P(1), 2, 2a, 2a', 3
	V-VII	$\frac{4}{16}$	A4, 5 P1, 1a, 2, 2a, 3, 4, 4a, 5	$\frac{6}{9}$	A1, 2, 3 P(1), 2, 2a, 2a', 3
	VIII	$\frac{6}{9}$	M2, 4, 5 Pc, 1a, 1a', 2, 2a	$\frac{0}{7}$	Pc, 1, 1a, 2
	IX-X	8	1, 2, 3, 4	4	1, 2
	XI	4	3, 4	8	
	XII	9		12	

Table 4. Asymmetrical absence of P1 on abdominal sternites I–VII in ten specimens of *Eosentomon dian* sp. nov.

Abdominal sternite		I	II	III	IV	V	VI	VII
♂	L	—	+	+	+	+	+	+
	R	+	—	—	—	—	—	—
♂	L	+	—	+	—	+	+	+
	R	—	+	—	+	—	—	—
♂	L	—	?	—	—	—	—	+
	R	+	?	+	+	+	+	—
♀	L	—	+	+	—	+	+	+
	R	+	—	—	+	—	—	—
♀	L	+	+	+	—	—	—	—
	R	—	—	—	+	+	+	+
♀	L	—	—	+	+	—	—	+
	R	+	+	—	—	+	+	—
Larva II	L	+	—	—	+	—	—	+
	R	—	+	+	—	+	+	—
Larva II	L	+	—	—	—	?	—	+
	R	—	+	+	+	?	+	—
Larva I	L	—	—	+	+	+	+	+
	R	+	+	—	—	—	—	—
Larva I	L	?	—	+	+	+	—	—
	R	?	+	—	—	—	+	+

L, left; R, right; ?, indeterminate; +, presence; —, absence.

Tracheal camerae slender. Foretarsus (Fig. 2C–D) 77–83  $\mu\text{m}$  (65–69  $\mu\text{m}$  in larva II and 58–63  $\mu\text{m}$  in larva I), TR=4.3–4.7; empodium subequal to the claw in length; S-shaped seta a little shorter than the claw. Dorsal sensilla *t1* about a halfway between  $\alpha 3$  and  $\alpha 3'$ , BS=1.0; *t2* short; *t3* long, its apex almost reaching the end of tarsus. Exterior sensilla *a* of medium size; *d* broad and relatively long, its apex reaching the base of  $\alpha 6$ ; *e* and *g* spatulate; *f1* thin, its apex surpassing the base of  $\gamma 5$ ; *f2* short. Interior sensilla *a'* somewhat distal to *t1*; *b'1* lacking; *b'2* short, its apex reaching the level of  $\alpha 5$ ; *c'* very short. Middle and hind tarsi with short empodia less than one-ninth the claw length.

Chaetotaxy as shown in Table 3. On thoraces II–III, dorsal P1a situated somewhat posterior to the row of P1 and 2, seta-like and a little longer than P1, P2a on the same row as P2 and 3, about a half of P2 in length. Abdominal tergites II–IV each with five pairs of anterior setae; terg. V–VII each with two pairs, A4 and 5; terg. IX–X each with four pairs of tergal setae; terg. XI with two pairs, without tergal setae 1 and 2; sternite VIII with seven posterior setae, without anterior setae; stern. IX–X each with four sternal setae and without 1a. On terg. I, P1a situated somewhat posterior to the row of P1 and 2, hair-like

and a little shorter than P1, P3 sensilla-like, very short, P4 rudimentary, only its socket being visible. On terg. II–VI P1a and 2a situated somewhat posterior to the row of P1 and 2, hair-like and a little shorter than P1. On terg. VII, P1a situated on the same row as P1 and 2, sensilla-like and short, less than one-fifth of P1 in length. On terg. VIII, P1a' without basal dilatation, in normal position. On sternites I–VII, one of P1 asymmetrically absent in all the specimens examined, not only in the adults but also in the larval stages, as in *Eosentomon belli* (Table 4). Lateral stigmata II–IV distinct, with no reticulation. Lateral sclerotization on stern. VIII distinct.

On female squama genitalis, caput processus obliquely curved towards the median edge of stylus, filum processus of medium length, proximolateral sclerotization developed (Fig. 2B).

Holotype: ♀, Mt. Ailao Shan, 2,450 m alt., Jingdong, Yunnan, 28-III-1993, collected by XIAO Ning-nian and others.

*Notes.* The present species is closely similar in many respects to *E. belli* YIN from the tropical forests in Xishuangbanna, Yunnan, especially, in the irregular absence of P1 on abdominal sternites I–VII, in the structure of pseudoculus and in the position of foretarsal sensillae. It is, however, distinguishable from the latter by the structure of female squama genitalis and by the chaetotaxy of abdominal tergites V–VII as well as by the relative lengths of foretarsal sensillae, *t3*, *fl* and *c'*. The distributional range of this new species seems to be restricted to the subtropical mountainous forests of Yunnan.

The specific name is derived from Dian, an old poetic appellation and also a simplified name of Yunnan.

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